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## Temporal variability of phytoplankton communities in Padilla Bay, Washington

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# Temporal variability of phytoplankton communities in Padilla Bay, Washington



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## Background

The Padilla Bay National Estuarine Research Reserve (NERR) conducts long-term monitoring of water quality and zooplankton communities. Since 2016, in-situ chlorophyll *a* and phytoplankton sampling have become a part of this monitoring program.

### Why is monitoring phytoplankton important?

Phytoplankton are a critical component of marine food webs and shifts in community composition may indicate ecosystem changes, such as nutrient availability or grazing pressures.

### Monitoring Objectives:

- Determine temporal variability of phytoplankton abundance and community composition
- Investigate possible drivers of phytoplankton community dynamics

## Methods



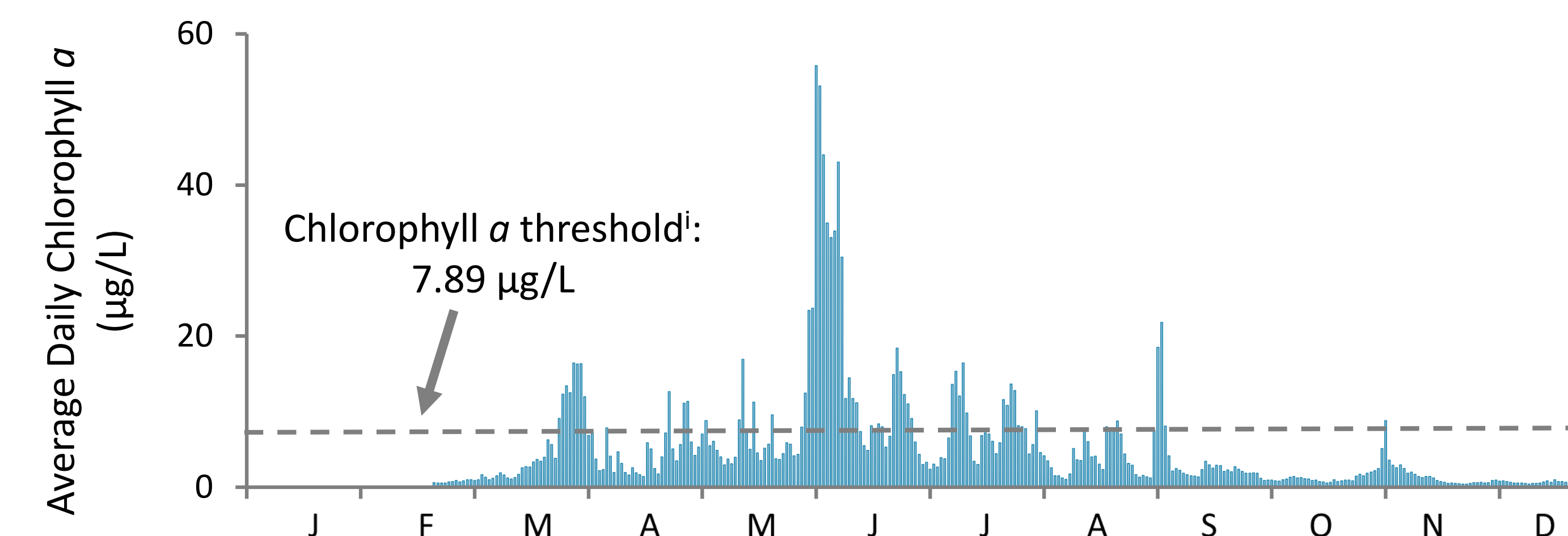
Monitoring station at Gong buoy (above) and location in the Padilla Bay NERR (right). Base map by Marice Callewaert.



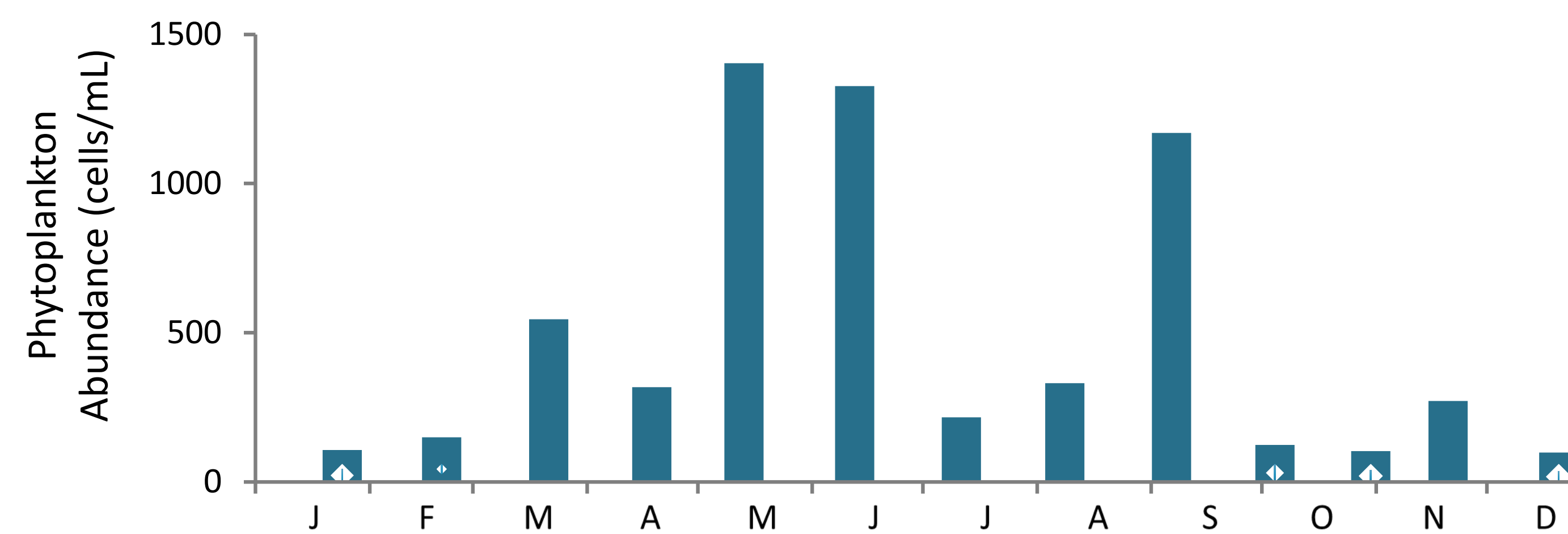
### Monitoring Station at Gong Buoy

- Continuous in-situ chlorophyll *a* (YSI EXO total algae sensor, 15 minute intervals)
- One 2-liter whole water sample collected at surface monthly. Phytoplankton identified to genus and enumerated using a 100  $\mu$ L Palmer-Maloney chamber
- Timing of the spring bloom determined as the date when daily average chlorophyll *a* surpassed the 1.5x the annual average<sup>i</sup>

## Chlorophyll *a* and Phytoplankton Abundance



Average daily in-situ chlorophyll *a* at Gong monitoring station in 2019. Chlorophyll *a* threshold value determined as 1.5x the annual average<sup>i</sup>. Data missing 1/1/19-2/21/19.



Phytoplankton abundance of whole water samples collected monthly at Gong monitoring station in 2019.

### Chlorophyll *a*

- Spring bloom began 3/27/19
- Greatest in June
- Decreased after early Sept

### Phytoplankton Abundance

- Greatest in May, June, and Sept
- Decreased in July and August
- Low abundance in Jan, Feb, Oct-Dec

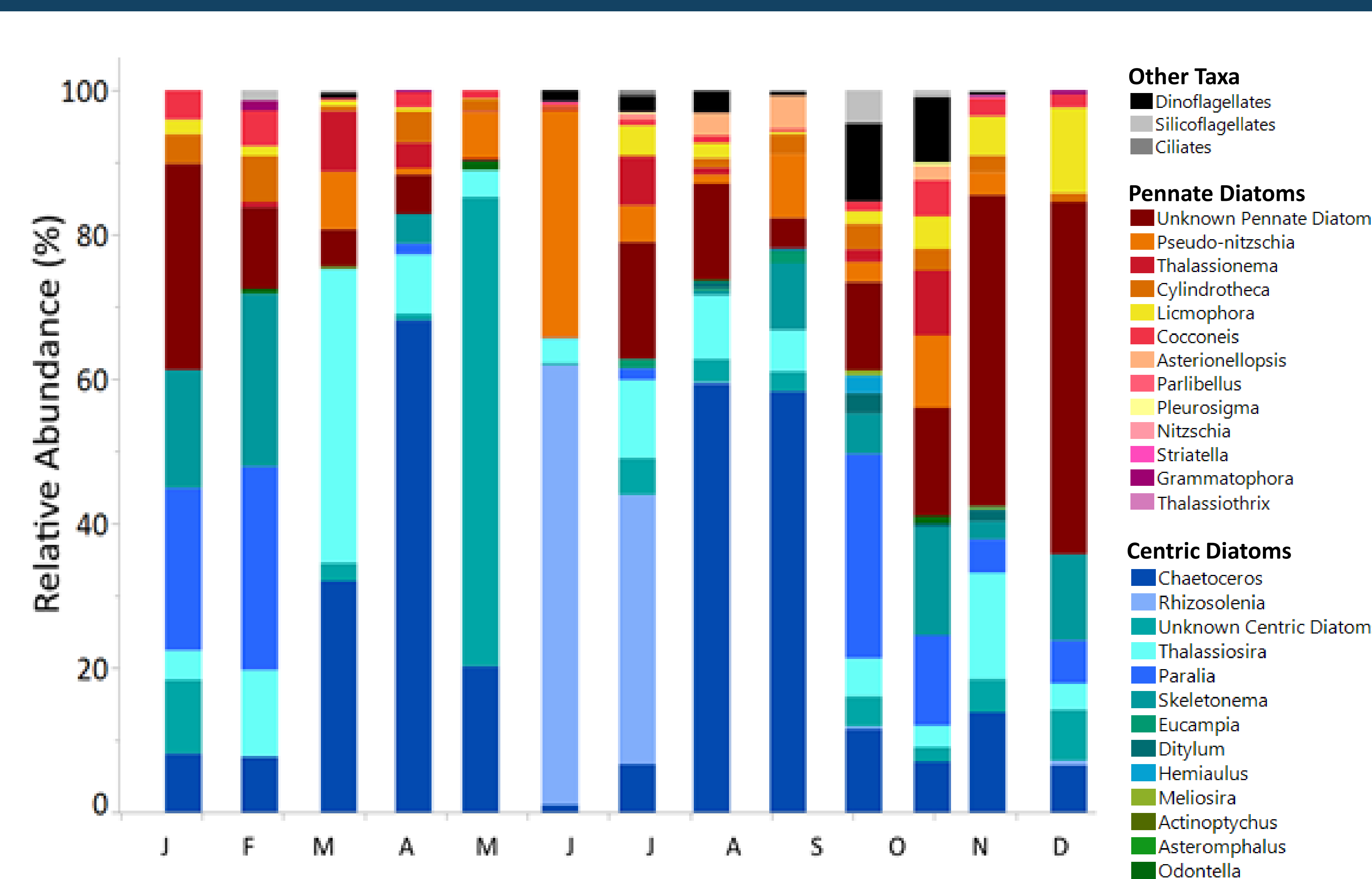
## Key Take Aways

- Chlorophyll *a* and phytoplankton abundance varied seasonally
- Centric diatoms were the most abundant genera throughout the year
- 2019 data demonstrated that the Padilla Bay phytoplankton community was very dynamic
- Continued monitoring of phytoplankton, combined with other abiotic or ecological parameters, can improve our understanding of these communities as indicators of ecosystem change

## Next Steps

- Explore temporal relationships between phytoplankton and water quality parameters
- Are top-down or bottom-up controls driving phytoplankton communities in Padilla Bay?

## Phytoplankton Community Composition



Relative abundance of the phytoplankton community by genera from samples collected monthly at Gong monitoring station in 2019.



**March & April:**  
*Thalassiosira* and *Chaetoceros* initiated the spring bloom

### May - July:

- An unknown centric diatom was dominant in May
- *Rhizosolenia* was dominant in June and July
- *Pseudo-nitzschia* was also dominant in June



**August & September:**  
*Chaetoceros* made a comeback